PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Patent of:	)	
	)	
KODAS et al.	)	REQUEST FOR CERTIFICATE OF
	)	CORRECTION OF PATENT UNDER 37
Patent No.: 7,316,725 B2	)	C.F.R. SECTIONS 1.322(a) AND 1.323
	)	
Issued: January 8, 2008	)	
	)	
Confirmation No.: 8009	)	
	)	
Atty. File No.: 41890-01684	)	
	)	
For: "COPPER POWDERS, METHODS FOR PRODUCING POWDERS AND DEVICES FABRICATED FROM SAME"	)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir or Madam:

This is a request for a Certificate of Correction for PTO mistake under 37 C.F.R. 1.322(a). The errors in the patent are obvious typographical errors or omissions and the correct wording can be found in the original specification at Page 1, line 10, Page 45, line 1, and Page 71, line 1. Attached are copies of documentation that unequivocally supports patentee's assertion(s).

This is also a request for issuance of a Certificate of Correction for Applicant's mistake. The errors in the patent are obvious typographical errors. Attached is form PTO 1050 and a payment in the amount of $100.00 to cover the fee set forth in 37 C.F.R. Section 1.20(a). Please credit any over-payment or debit any underpayment to Deposit Account No. 50-1419.

Respectfully submitted,

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Date: JAN. 16, 2008

COPPER POWDERS METHODS FOR PRODUCING POWDERS AND DEVICES FABRICATED FROM SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to copper metal powders and to methods for producing such powders, as well as devices incorporating the powders. In particular, the present invention is directed to powder batches of copper metal particles that can have a well controlled average particle size, well controlled particle size distribution, spherical morphology and high crystallinity.

2. Description of Related Art

Many product applications require metal-containing powders with one or more of the following properties: high purity; high crystallinity; small average particle size; narrow particle size distribution; spherical particle morphology; controlled surface chemistry; reduced agglomeration; and high density (low porosity). Examples of metal powders requiring such characteristics include, but are not limited to, those useful in microelectronic applications, such as for the internal electrodes and external terminations of multi-layer ceramic capacitors (MLCC's), for conductive traces on hybrid integrated circuits, multilayer ceramics or multichip modules, and for resistors and other devices.

Electronic devices such as capacitors, and in particular MLCC's, have traditionally used electrodes fabricated from noble metals such as silver palladium and mixtures/alloys thereof. MLCC's are fabricated by stacking alternate layers of a ceramic dielectric and a conductive metal and then sintering (heating) the stack to densify the layers and obtain a monolithic device. Most ceramic dielectric compounds are oxides that must be sintered at an elevated

generator 106 for preparation of the aerosol 108 to form the dry particles 112 in the furnace 110, which particles 112 can then be coated in the particle coater 350. Maintaining particles in a dispersed state from manufacture through coating avoids problems associated with agglomeration and redispersion of particles if particles must be redispersed in the liquid feed 102 for feed to the aerosol generator 106. For example, for particles originally precipitated from a liquid medium, the liquid medium containing the suspended precipitated particles could be used to form the liquid feed 102 to the aerosol generator 106. It should be noted that the particle coater 350 could be an integral extension of the furnace 110 or could be a separate piece of equipment.

In a further embodiment of the present invention, following preparation of the particles 112 in the furnace 110, the particles 112 may then be structurally modified to impart desired physical properties prior to particle collection. Referring now to Fig. 46, one embodiment of the process of the present invention is shown including such structural particle modification. The particles 112 exiting the furnace 110 go to a particle modifier 360 where the particles are structurally modified to form modified particles 362, which are then sent to the particle collector 114 for preparation of the particulate product 116. The particle modifier 360 is typically a furnace, such as an annealing furnace, which may be integral with the furnace 110 or may be a separate heating device. Regardless, it is important that the particle modifier 360 have temperature control that is independent of the furnace 110, so that the proper conditions for particle modification may be provided separate from conditions required of the furnace 110 to prepare the particles 112. The particle modifier 360, therefore, typically provides a temperature controlled environment and necessary residence time to effect the desired structural modification of the particles 112.

The structural modification that occurs in the particle modifier 360 may be any

oxidize appreciably upon exposure to air.

The powder batches of copper metal particles according to the present invention are preferably also substantially unagglomerated, that is, they include substantially no hard agglomerates of particles. Hard agglomerates are physically coalesced lumps of two or more particles that behave as one larger, irregularly-shaped particle. Agglomerates are disadvantageous in most applications. For example, when agglomerated metal powders are used in a thick film paste, the sintered metal film that is formed can contain lumps that lead to a defective product. Accordingly, it is preferred that no more than about 0.5 weight percent of the copper metal particles in the powder batch of the present invention are in the form of hard agglomerates and more preferably no more than about 0.1 weight percent of the particles are in the form of hard agglomerates.

According to one embodiment of the present invention, the copper metal particles are metal composite particles wherein the individual particles include a metal phase and at least one non-metallic phase associated with the metal phase, such as one that is dispersed throughout the metal phase. For example, the metal composite particles can include a metal oxide dispersed throughout a copper metal phase. Preferred simple metal oxides can include, but are not limited to, NiO, SiO_2, Cu_2O, CuO, B_2O_3, TiO_2, ZrO_2, Al_2O_3, ZnO, SnO, SnO_2, BeO, V_2O_5 MoO. Also, the metal composite particles can include a metal phase and a non-metallic phase comprising carbon. Such a metal composite can be formed by dispersing a particulate carbon precursor in a copper precursor and forming the particles as described above.

Metal oxides can advantageously modify the characteristics or other properties of the copper metal particles, such as increasing the sintering temperature of the powder or modifying the thermal expansion characteristics of the powder. Metal oxides can also

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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,326,725 B2

APPLICATION NO.: 10/758,866

ISSUE DATE : January 8, 2008

INVENTOR(S) : KODAS et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, Line 45, delete "rnultichip" and insert therefor --multichip--.

Column 24, Line 60, delete "enerator" and insert therefor --generator--.

Column 39, Line 7, delete "xidize" and insert therefor --oxidize--.

Column 52, Line 44, delete the second occurrence of "is from about".

MAILING ADDRESS OF SENDER (Please do not use customer number below):

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